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Flexible cellular polymeric materials - Determination of hysteresis loss

软质泡沫聚合材料 滞后损失试验方法

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1 Scope

This standard specifies two test methods for determining the hysteresis loss properties of flexible cellular polymeric materials.

- Method A: Determination of hysteresis loss by compression method;

- Method B: Determination of hysteresis loss by depression method.

This standard applies to the determination of hysteresis loss of flexible cellular polymeric materials. Method A and method B in this standard are applicable to standard size specimens, which are cut from block materials or molded specimens with various shapes; method B is also applicable to molded products with various shapes.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 2918-1998 Plastics - Standard atmospheres for conditioning and testing

GB/T 6342-1996 Cellular plastics and rubbers - Determination of linear dimensions

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Hysteresis loss

After the specimen is deformed by the compression method (the indenter area is larger than the specimen area) or the depression method (the indenter area is smaller than the specimen area), the specimen is immediately allowed to recover and the ratio of the lost work to the loaded work in this process is measured.

between the support plate (see 5.2) and the indenter (see 5.3). The indenter can move perpendicular to the support plate at a constant speed required by this test: (50 ± 5) mm/min, (100 ± 20) mm/min, (250 ± 25) mm/min.

The testing machine shall have the ability to measure the force to produce the specified deformation with an accuracy of ±1%, and the ability to measure the specimen thickness at an accuracy of ±0.2 mm under load.

The testing machine shall be equipped with a device for automatically drawing the test load-displacement curve.

5.2 Support plate

The support plate is made of rigid material. The surface shall be smooth, flat, horizontal and larger than the specimen. The support plate shall be provided with multiple holes with a diameter of 6 mm and a hole spacing of 20 mm, to facilitate the discharge of gas generated during the test.

5.3 Indenter

Method A (compression method): The indenter can be of any suitable size and shape (round or square is recommended), with a smooth but unpolished surface and shall be parallel to the support plate; the specimen shall be overlapped from all directions.

Method B (depression method): The indenter surface is smooth but not polished; it is assembled using a ball-type connector to prevent vertical movement OR it may use other appropriate methods. The diameter of the indenter is 200^{+3}_{0} mm; the radius of the bottom edge is $1.0^{+0.5}_{0}$ mm; it shall be parallel to the support plate.

5.4 Measuring tools

The measuring tools for measuring the size of the specimen shall comply with the provisions of GB/T 6342-1996.

6 Specimens

6.1 Shape and size

Method A (compression method): The side length of the specimen is (50 ± 2) mm and the thickness is (25 ± 2) mm. The final product can also be tested according to the agreement between the supplier and the buyer.

Method B (depression method): The side length of the specimen is 380^{+20}_{0} mm and the

Measure the specimen dimensions in accordance with GB/T 6342-1996.

8.2 Method A (compression method)

Place the specimen on the support plate, so that the center of the specimen or the position agreed upon by the supplier and the buyer is located below the indenter. The indenter pre-compresses the specimen twice at a speed of (250 ± 25) mm/min to 75% ~ 80% of the initial thickness of the specimen. After reaching this deflection, unload the pressure at the same speed. After each pre-compression, keep the indenter in contact with the specimen surface. After two pre-compressions, let the specimen recover for (6 ± 1) min.

After the specimen recovers, slowly lower the indenter and apply a force of about 140 Pa (not exceeding 200 Pa) on the specimen surface. Measure the specimen thickness. This value is the compression zero point.

Immediately compress the specimen at a speed of (50 ± 5) mm/min to (75 ± 5)% of the specimen thickness. Immediately unload at the same speed, until it is basically fully recovered.

The load-displacement curve must be fully recorded during the test.

Calculate the hysteresis loss according to formula (1).

8.3 Method B (depression method)

Place the specimen on the support plate, so that the center of the specimen or the position agreed upon by the supplier and the buyer is below the indenter. Slowly lower the indenter and apply a force of 5^{0}_{-2} N on the specimen surface. Measure the specimen thickness. This value is the depression zero point.

The indenter pre-presses the specimen at a speed of (100 ± 20) mm/min to (75 ± 2.5)% of the specimen thickness. After reaching this deflection, the pressure is immediately unloaded at the same speed; then the specimen is allowed to recover for (4 ± 1) min.

After the specimen recovers, the specimen is immediately depressed at a speed of (100 ± 20) mm/min to (75 ± 2.5)% of the specimen thickness. After reaching this deflection, it is immediately unloaded at the same speed until it is basically fully recovered. The time interval between the end of loading and the beginning of unloading shall not exceed 2 s.

The load-displacement curve must be fully recorded during the test.

The hysteresis loss is calculated according to formula (1).

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